

Enrollment No: _____

Exam Seat No: _____

C.U.SHAH UNIVERSITY

Winter Examination-2020

Subject Name: Basic Mathematics

Subject Code: 2TE01BMT2/2TE01BMT3

Branch: Diploma (All)

Semester: 1

Date: 09/03/2021

Time: 03:00 To 06:00

Marks: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

Q-1 Attempt the following questions:**(14)****a)** If $A(2,7)$ and $B(-4,5)$ then mid-point of \overline{AB} is _____.

- a) $(-2,12)$ b) $(-1,6)$ c) $\left(-\frac{1}{2},3\right)$ d) $(-2,2)$

b) If two straight lines $y = m_1x + c$ & $y = m_2x + c$ are parallel then _____.

- a) $m_1m_2 = -1$ b) $m_1m_2 = 1$ c) $m_1 = m_2$ d) $m_1 = -m_2$

c) The distance between the points $(3,4)$ and $(8,-6)$ is

- a) $\sqrt{5}$ b) $5\sqrt{5}$ c) $\sqrt{55}$ d) $3\sqrt{5}$

d) If $\begin{vmatrix} x & 3 \\ 0 & -3 \end{vmatrix} = 0$ then $x =$ _____.

- a) 2 b) 0 c) -1 d) 1

e) If $A = \begin{bmatrix} 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \end{bmatrix}^T$ then $AB =$ _____.

- a) $\begin{bmatrix} 1 & 1 \end{bmatrix}$ b) $\begin{bmatrix} 0 & 0 \end{bmatrix}$ c) $\begin{bmatrix} 0 \end{bmatrix}$ d) $\begin{bmatrix} 1 \end{bmatrix}$

f) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ is a square matrix then $A' =$ _____.

- a) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ b) $\begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$ c) $\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$ d) none of these

g) $\binom{n}{n-1} =$ _____.

- a) n b) 0 c) 1 d) $n-1$



- h) If $A = \begin{bmatrix} -1 & 2 \\ 3 & -4 \end{bmatrix}$ then $\text{adj}A =$ _____.
- a) $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$ b) $\begin{bmatrix} -1 & -2 \\ -3 & -4 \end{bmatrix}$ c) $\begin{bmatrix} -4 & 2 \\ 3 & -1 \end{bmatrix}$ d) $\begin{bmatrix} -4 & -2 \\ -3 & -1 \end{bmatrix}$
- i) _____ is a constant term in the expansion of $\left(2x - \frac{3}{x}\right)^8$.
- a) 7th b) 5th c) 4th d) 3rd
- j) Constant term in the expansion of $(1-x)^4$ is _____.
- a) -1 b) 0 c) 1 d) 4
- k) $\frac{7\pi}{6}$ Radian = _____°.
- a) 310° b) 210° c) 420° d) 30°
- l) $\sin \alpha \cos \beta - \cos \alpha \sin \beta =$ _____.
- a) $\sin(\alpha + \beta)$ b) $\sin(\alpha - \beta)$ c) $\cos(\alpha + \beta)$ d) $\cos(\alpha - \beta)$
- m) If $\theta = \frac{\pi}{4}$ then the value of $\sin \theta + \cos \theta =$ _____.
- a) 2 b) $\sqrt{2}$ c) $\frac{1}{\sqrt{2}}$ d) -1
- n) $\tan^2 \theta - \sec^2 \theta =$ _____.
- a) -1 b) 0 c) 1 d) none of these

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions

- a) In what ratio and at which point does the line $y = x + 1$ divide the line segment joining the points $(0,0)$ and $(2,4)$? **(05)**
- b) Find the equation of line passing through the point $(1,-2)$ and perpendicular to the line passing through the points $(-1,1)$ and $(-2,-3)$. **(05)**
- c) Show that the points $(1,0), (-1,2)$ and $(0,1)$ are collinear. **(04)**

Q-3 Attempt all questions

- a) If $A = \begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 4 \\ 2 & 1 \end{bmatrix}$ are two matrices then verify that $(AB)^T = B^T A^T$ **(05)**
- b) Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$. **(05)**



c) If $A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & -2 \\ 0 & 5 \\ 3 & 1 \end{bmatrix}$ then find matrix $A + 2B$ and $3A - 2B$. (04)

Q-4 Attempt all questions

a) If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then prove that $A^2 - 4A - 5I = O$. (05)

b) Solve the equations $2x - y = 4$ and $3x + y = 1$ by using matrix method. (05)

c) Use Binomial theorem to find approximate value of $\frac{1}{(1.05)^4}$ correct up to three decimal places. (04)

Q-5 Attempt all questions

a) Find the co-efficient of x^4 in the expansion of $(2x + y)^{10}$. (05)

b) Expand: $(2x + 3y)^5$ (05)

c) Find the middle term in the binomial expansion of $\left(\frac{x}{2} - \frac{2}{y}\right)^8$. (04)

Q-6 Attempt all questions

a) Find the constant term of $\left(x - \frac{1}{x}\right)^{10}$. (05)

b) Find the centre and radius of the circle $2x^2 + 2y^2 - 7x - 3y + 1 = 0$. (05)

c) Find the equation of the circle passing through $(4, -5)$ and the centre is $(3, 5)$. (04)

Q-7 Attempt all questions

a) Evaluate: i) $\sin^2 30^\circ + \cos^2 45^\circ - \operatorname{cosec}^2 60^\circ$
ii) $\operatorname{sec}^2 660^\circ - \sin^2 30^\circ$ (05)

b) Draw the graph of $y = \sin 2x$, $0 \leq x \leq \pi$. (05)

c) If $\tan A = \frac{1}{2}$, $\left(0 < A < \frac{\pi}{2}\right)$ and $\tan B = \frac{1}{3}$ then find the value of $\tan(A + B)$. (04)

Q-8 Attempt all questions

a) Prove that $\frac{\sin 7A + \sin 3A}{\cos 3A - \cos 7A} = \cot 2A$. (05)

b) If $\tan(A + B) = 3$ and $\tan(A - B) = 5$ then find $\tan 2A$ and $\tan 2B$. (05)



c) Prove that $\sin^2 \frac{\pi}{4} + \sin^2 \frac{3\pi}{4} + \sin^2 \frac{5\pi}{4} + \sin^2 \frac{7\pi}{4} = 2$

(04)

